NEWS OF THE WEEK.

Wright's Flight for the Michelin Cup: Official Record.

THE Committee who witnessed Wright's long flight for the Michelin Cup on December 18th have issued their official report, which gives the following details of the event.

The course was marked out by flags forming an isosceles triangle, having two long sides of 1 kilom. each and a short side of 200 metres, the total length being thus 2·2 kiloms.

Wilbur Wright started by the aid of his derrick at 10h. 11m. 40s. a.m. He made forty-five complete circuits of the triangle in 1h. 53m. 59⅘s., which is equivalent to 99 kiloms., reckoning according to the Michelin Cup rules. In addition he flew 400 metres to and from his starting rail, thereby bringing the total official distance to 99·8 kiloms., which constitutes the world's record to date. The total duration of the flight was 1h. 54m. 53⅘s.

His Previous and Latest Speed Records.

ON September 21st, as our readers will remember, Wright flew 66·6 kiloms. in 1h. 31m. 20⅘s.; on December 18th the same distance, reckoning from the commencement of the Michelin Cup flight, occupied only 1h. 15m. 57⅘s., or conversely he flew 12·4 kiloms. further in the same time.

His Further Attempts.

IT was Wilbur Wright's intention to make a further attempt to improve his record for the Michelin Cup on December 26th, his flight on the 18th of that month having been brought to a premature conclusion by the accidental closing of the petrol tap. As the thermometer registered 2 degrees of frost, however, he decided that it would be too unpleasantly cold to remain as long in the air as he wished, and but for the arrival of M. Henri Lillaz (chief official in the Public Works Department) he would not have gone out at all. As it was, he only made a short demonstration flight at half past three in the afternoon. There was a little delay in starting, but once the motor was got under way, Wright indulged his visitors to a very fine sight, for instead of going far away, he made sudden turns, rising and falling at an angle of 45 degrees or thereabouts, sometimes coming quite close to the ground, and at other times spinning across the heads of the officials. As a grand finale he made five circuits of the trial ground at a speed of from 50 to 60 kiloms. per hour, with the engine going all out, and finally he descended just in front of his shed.

It has been reported that when Mr. Wright examined his machine before the start of this demonstration flight —which it must be remembered was to have been his big attempt for the Michelin Cup — he found petrol instead of lubricant in his oil tank. If this be true, it would have been a singular mistake for Wright himself or any of his assistants to have made, and it is significant that he was prevented for the first time from returning to sleep in his shed on Christmas night through dining with the members of the Sarthe Aero Club.

On Wednesday of this week Wright again made an effort to improve upon his record, but once more the excessive cold—18 degrees Fahrenheit—stopped him just before he reached the 99 kiloms. As it was, he succeeded in covering 98·6 kiloms. (61⅓ miles) in 1h. 52m. 40s. Although wrapped up in a rug and woollen head-gear, he was half frozen when he decided to come to earth, and it required two men to run the aviator up and down the grounds to restore his circulation, prior to his unfreezing in front of a huge fire. The planes of his machine, moreover, were frozen stiff as buckram, oil and water being also reduced almost to solid blocks.

On Thursday he was determined to again attempt a bigger record.

Wilbur Wright's Migration.

WILBUR WRIGHT does not like the cold weather, and as the days of glass screens and exhaust-heated floor-boards have not yet arrived in the aeronautical world, he has to bear the full brunt of the elements, with the assistance of a favourite leather waistcoat, which, as a French contemporary politely expresses it, "fut élégant aux premiers âges de l'automobile." Very soon now, however, he will migrate to a warmer climate, for it is expected that he will start for Pau late in January. It is also reported that he may shortly visit Italy in response to an invitation from the Italian Aeronautical Society, who have, it is said, asked him to allow three Italian aeronauts to attempt flights on his machine. It was not until Monday last that he found time to visit the Paris Salon, where he made a critical inspection of the exhibited machine which bears his name.

Flight at Olympia.

STEPS are now being taken by the Society of Motor Manufacturers and Traders to obtain exhibits for the aeronautic section of the exhibition to be held at Olympia next March, so as to make it a thoroughly representative show. With this end in view, Mr. T. F. Woodfine, the Secretary, was in Paris during the Christmas holidays, endeavouring to induce the successful French experimenters to exhibit in London.

The Marquis de Mouzilly de St. Mars Enters the Field.

A PURCHASE of considerable interest, which is reported to have been effected at the Paris Salon, concerns the acquisition of a Breguet aeroplane by the Marquis de Mouzilly de St. Mars. The machine, which is to be fitted with one of the Gobron aviation motors, is quite unlikely to be anything like the helicopter exhibited at the Salon, although, if made by Breguet himself, it is pretty well certain to have a steel framework throughout. According to rumour, it is to be a biplane with two propellers, but there is an air of mystery about most purchases of aeroplanes at the present time.

The Marquis himself is a well-known figure in English motoring circles, where he has in especial conferred his patronage upon the motor cycling movement, and has been a very good friend indeed to that cause. We welcome his early advent in the flying world, and wish him every success in his endeavours, more especially as we understand that he proposes bringing his aeroplane to this country, where it will be one of the first to be given a practical trial.

German Aeroplane—The Grade.

IT is reported from Berlin that an engineer named Grade has succeeded in making flights of from 100 to

400 metres in length at an altitude of about 1 metre and at speeds varying from 30 to 40 kiloms. per hour.

"Antoinette IV" at Work.

PILOTED by M. Welferinger, the monoplane, "Antoinette IV" made some successful flights at Issy on Wednesday of last week, December 23rd. The flights were carried out at an altitude of 8 metres, and the parade ground was traversed in all directions. Later on, M. Welferinger will make tests with the machine which was exhibited at the Paris Salon.

During one of the flights with "Antoinette IV" it is stated that the "closed" circuit kilom. was accomplished at a speed of 75 kiloms. an hour. The occasion was during the flights carried out on December 26th.

Abris-Calas Aeroplane.

TWO old students of the Marseilles School of Engineering, MM. Abris and Calas, are constructing an aeroplane something on the lines of the Wright aeroplane, which will be fitted with a 4-cyl. Gregoire engine.

An Aeroplane from Spain—The Sanchis.

ANOTHER aeroplane, which has been designed somewhat on the lines of the Wright model, is one which a Spanish engineer named Sanchis has brought before the notice of his Government at Madrid. It is reported that official trials are to take place.

Aeronautics in Spain.

A GRANT of 300,000 pesetas for the acquisition of flying machines has been asked for in the Spanish Budget.

Juvisy Aerodrome Opens on January 10th.

THE event of next week in the flying world will be the opening, on January 10th, of the Juvisy Aerodrome, belonging to the Société d'Encouragement à l'Aviation.

Liege-Spa Aero Club.

THE Aero Club of Liege-Spa was recently formed at the head-quarters of the Liegeois Automobile Club, under the Presidency of M. Emil Digneffe. MM. Dumoulin and Piedboeuf are vice-presidents and Chevalier Jules de Thier is general secretary.

Seine-et-Oise A.C. Aero Section.

RECOGNISING the importance of flight, the Seine-et-Oise Automobile Club has formed an aeronautical section, which is at present under the control of MM. Maunel, Petitpas, Eté, Sarret, and Allayrac.

Union Française Aerienne.

YET another aeronautical body has sprung up in France with the object of furthering the interests of flight by the enrolling of members at small annual fees, and the inspiring of more wealthy persons to become patrons by the payment of larger sums. This latest body is the Union Française Aerienne, which has been founded by Baron G. Onffroy de Verez, and M. Couronneau, with offices at 56 Rue de Rome, Paris. Members are admitted at 5 fr. a year, life members for 100 fr. down, patrons for a minimum donation of 200 fr. and founder members for a minimum donation of 1,000 francs. The following are the principal objects of this new society:—(1) the study of aeronautics generally by a committee of engineers chosen from among the members of the society; (2) the construction of experimental flying machines at the expense of the society's funds; (3) the holding of lectures on flight; (4) the acquisition of an aerodrome; (5) the holding of aeronautical concours; (6) organising a permanent exhibition of small scale models.

The town of Hyères has voted a sum of 500 francs for the furtherance of the project.

Dufayel Prize.

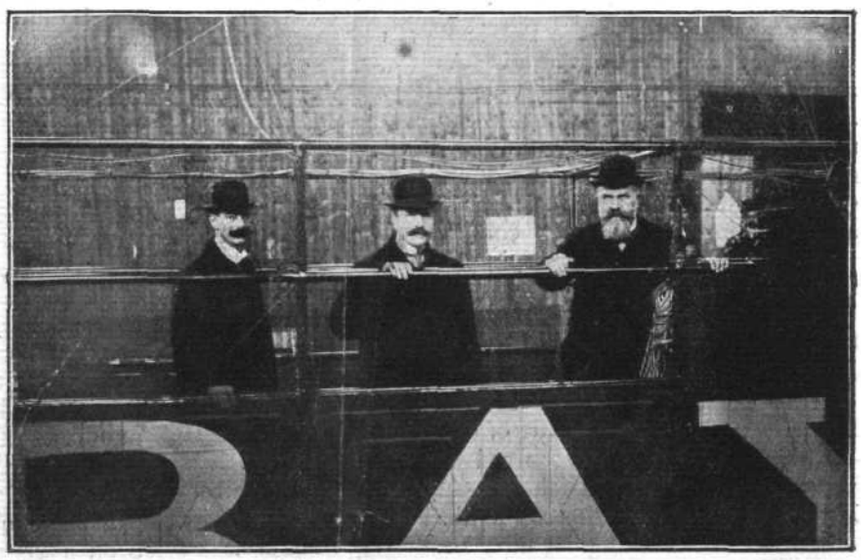
FOUNDED at a luncheon held at the Grand Palais on the opening day of the Paris Aeronautical Salon, the Dufayel Prize was auspiciously inaugurated. M. Dufayel has placed at the disposal of the Automobile Club of France, who are charged with the organisation of the event, a sum of 20,000 francs to constitute four prizes in a race from Bagatelle to Sainte-Adresse. The event is to take place on July 18th, 1909, and it is specified that the journey must be finished on the same date. The prize money is to be divided into sums of 10,000, 5,000, 3,000 and 2,000 francs.

All the aviators present at the meeting when the prize was founded, including MM. Bleriot, Kapferer, Pelterie, Delagrange, Breguet, Surcouf and Voisin, notified their intention of competing.

It was subsequently decided that if the aviator should carry a lady passenger he would, by winning, receive an additional 5,000 francs.

M. Quinton's Wager.

DURING the course of the same interesting function, M. Quinton, founder of the Ligue Nationale Aerienne, offered to wager a sum of 10,000 francs that before five years an aviator would fly from Paris to Indus in 48 hours. There are truly progressive ideas in France.



Rumours are rife that M. Clement intends some fine day, not over distant, to sail across the Channel in his fine Bayard-Clement airship and cross London, thereby in a measure fulfilling the suggestion of the Duke of Argyll put forward at the recent Aero Club Dinner. In the meantime Lord Shrewsbury and Mr. Frank Shorland, Chairman and General Manager of Clement-Talbot, Ltd., respectively, upon a recent visit to Paris, were passengers with M. Clement (a Vice-Chairman of the Company) in the airship, our photograph being taken upon the occasion. No doubt this little gathering may have some significance in regard to the rumoured trip.

The Lortet Prize.

M. LORTET, of Tarbes, has offered a prize, consisting of an ingot of gold weighing 1 kilog., to the aviator who first starts from Tarbes and descends on certain property belonging to M. Lagarde, situated 10 kiloms. away. At the present price of bar gold the prize is worth about 3,400 francs.

The Soulé Prize.

M. SOULÉ, who has already subscribed half of the prize offered by the town of Bagneres, has now given the Ligue Nationale Aerienne another personal prize of 2,000 francs, to be awarded to the first aviator who descends from an altitude of 500 metres, without using his engine, while following naturally sloping ground; in other words, the aviator must glide down the side of a mountain without touching earth.

Flight Experiments in America.

THE Aerial Experiment Association are continuing their experimental work in America, and have just completed their fourth aeroplane, which has been christened "Silver Dart." It follows very much the lines of the "June Bug," but is slightly smaller. The planes are 6 ft. across at the centre, where they are placed 6 ft. apart, diminishing to 4 ft. wide at the tips and 4 ft. apart. The spread of the wings, including the movable tips at each end, is 49 ft., and the total lifting area of the machine amounts to 420 sq. ft.; 15 ft. in front of the main planes there is a double elevating rudder, while at the rear—11 ft. from the main planes—is the single vertical rudder. The wooden propeller is also at the rear, is 8 ft. in diameter, and driven at a speed of 1,000 revs. per min. by an 8-cyl. Curties motor. At each end of the main planes are fitted movable triangular planes which are controlled by the swaying of the operator's body. These "wing tips" have a total area of 40 sq. ft.

The "June Bug" has now been slightly remodelled and mounted on pontoons, so that experiments may be conducted upon the water. During some recent tests upon Lake Keuka at Hammondsport, N.Y., the machine, now known as the "Loon," covered 2 miles (1 mile with and 1 against a wind of 5 or 6 miles an hour) at an average speed of 27·06 miles per hour, but this was not sufficient to enable the apparatus to completely rise from the water. Further experiments are now being conducted with hydroplane hulls of various types.

Airships and Wireless Telegraphy.

WITH the object of ascertaining whether the working of wireless telegraphy from airships would in any way prove a source of danger to the occupants, the German military authorities have recently been carrying out extensive experiments. Apparently the results have been entirely satisfactory, and show that no danger need be anticipated; similar conclusions have, it is stated, already been arrived at by the French and Belgian authorities.

Zeppelin Subscription.

ON December 24th the Zeppelin Subscription Fund was closed, with a total of over six million marks.

Ballooning Home.

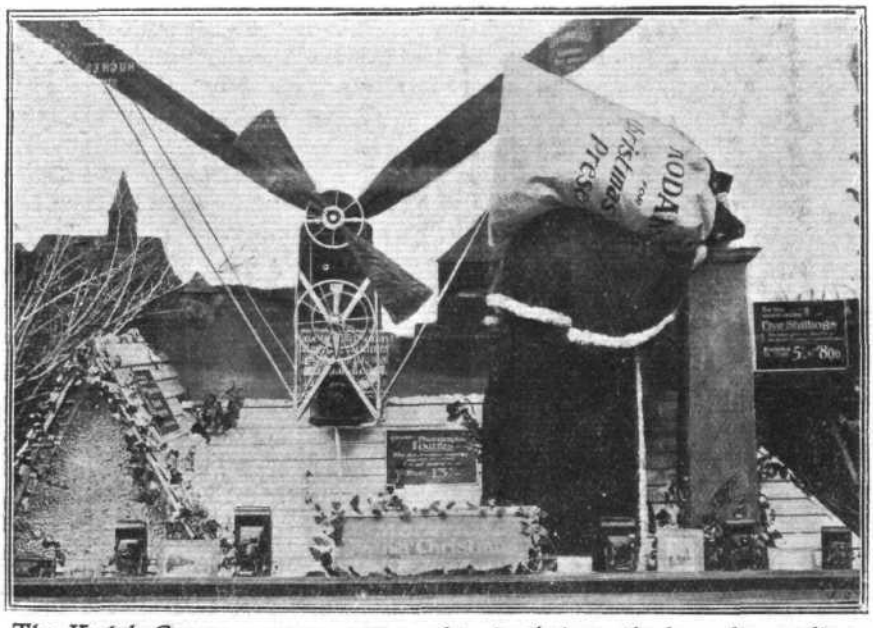
ON Saturday last the Hon. C. S. Rolls gave an exhibition of the possibilities of ballooning by taking his mother, Lady Llangattock, home by balloon. The ascent was made at Monmouth in the balloon "Mercury," the occupants of the basket being Lady Llangattock, Hon. C. S. Rolls, Hon. Mrs. Assheton-Harbord, Mr. Claud Crompton, and Mr. Charles Freeman, and the balloon landed on the lawn in front of Lord Llangattock's house, The Hendre. After lunch the balloon again ascended, Lady Llangattock relinquishing her place to Mr. Benham Smith, and after crossing the mountains, the peaks of which were covered in clouds, the balloon was finally brought down at Blaenavon. All the ropes, &c., attached to the balloon were frozen.

Monster Balloon Trip.

MR. CARL FISHER and Mr. George Bumgaugh are, it is reported, arranging to cross the Atlantic from the eastern coast of America in a gigantic balloon. A feature of the experiment will be the carrying of supplementary ballonettes containing a reserve supply of gas for the purpose of replenishing the main envelope. A specially-designed boat is to take the place of the usual basket, and a small steamer will accompany the expedition to render aid in case of emergency. An experimental ascent was made recently with the "Columbia," of 40,000 cu. ft. capacity, with two 2,000 cu. ft. ballonettes attached.

Airy Hopes.

LAST week, at the Shoreditch County Court, Judge Smyly met a *rara avis*—a creditor who did not wish to press a judgment summons. Such an extraordinary state of affairs demanded investigation, and it transpired that the plaintiff had been mollified by the fact that the debtor was interested in an airship invention, which he thought was "all right." The Judge seemed a little dubious, as a great many other people were interested in such patents, but in view of the optimistic view taken by the plaintiff the case was adjourned for a month.



The Kodak Company are ever up to date in their methods, and preceding the Christmas Holiday their window in the Strand, reproduced in our photograph, was a centre of considerable attention. This was arranged to represent the roof of a cottage, with Santa Claus just arrived by aeroplane laden with presents—naturally Kodak cameras—which he promptly pours down the recognised channel—the chimney. The "aeroplane" was the work of Mr. Chippendale.

THE FIRST PARIS AERONAUTICAL SALON.

ON Thursday, December 24th, the President of the French Republic opened the second half of the Annual Automobile Salon at the Grand Palais, and incidentally inaugurated the first real exhibition of practical flying machines that has ever been held anywhere. This is the first occasion on which the industrial and pleasure car sections have been arranged consecutively, for hitherto they have, as our readers know, run concurrently in separate buildings. The executive, however, considered that the changed conditions warranted, if they did not compel, a departure from precedent, and hence the present arrangement by which the science of flight finds room for its expression among industrial vehicles and motor boats.

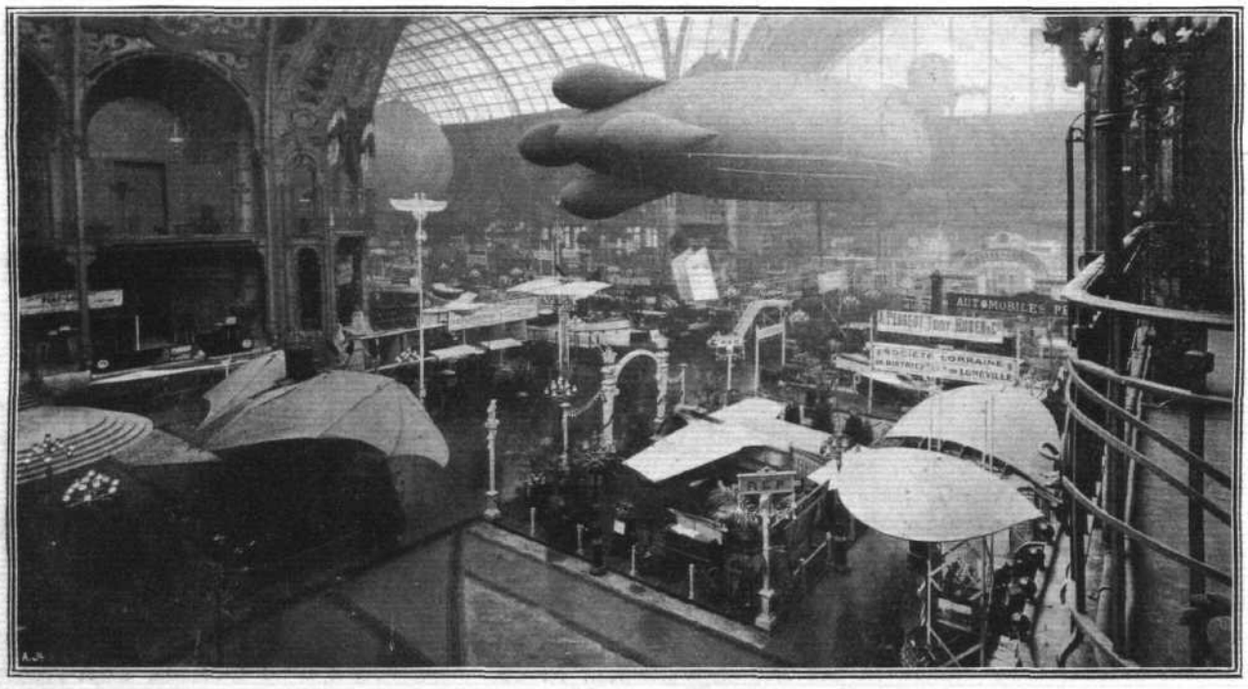
It is for this latter reason, too, that the "*deuxième serie*" of the 1908 Paris Salon has an importance which hardly attached to the pleasure car show, and is certainly not accorded by the majority of the visitors to the industrial vehicles now on view. The flying machines are, without a shadow of doubt, the main attraction for everyone; but whether this had happened to be the case or not, the fact would still remain that they are sufficiently in evidence to justify the use of the significant title, "First Aeronautical Salon." It is an event sure to be of historic interest in the future—even in the very near future, if the progress of flight continues as rapidly as it is doing at present—and as such it must form a basis of comparison for all time.

Those visitors to the Grand Palais who, going specially to see the aeronautical exhibits, entered for the first time by the main doors, must have been disappointed, even if they were not surprised—for no one quite knew beforehand how the show was going to turn out—to find themselves entirely surrounded by heavy machinery and industrial motor vehicles. At first glance, flying machines and all other *appariels d'aviation*, are apparently absent, and it is not until the Grande Nef has been traversed towards the Cupole d'Antin that the Aviation Section is reached. True, there is the "Ville de Bordeaux" airship suspended aloft above this very aisle, but it is so big that its long yellow envelope is not at first observed, although the two iron staircases which lead up to its car cause a sufficiently obvious obstruction in the gangway. Further down the Grande Nef, too, is a spherical balloon also hung from the lofty roof by wires, and it, being in the immediate perspective, is the more noticeable of the two.

It is, however, around the Grand Staircase and beneath the Cupole d'Antin that those interested in flight congregate. Placed on a pedestal, in a position of honour, a fearful and wonderful bird-like structure stretches its uncanny wings in silent benediction over all who enter; it is Ader's Avion (No. 3) which is thus so appropriately placed to form at once a portal to the present and a link with the past. Looking down from the superior elevation of the staircase—and, therefore, in an equally appropriate place—is the full-sized Voisin aeroplane known as "Farman I." Messrs. Voisin, as designers and constructors of some of the leading French machines, deserve a degree of credit for their work, which is far higher than the uninitiated are apt to accord them, although their name must of course always stand second to those intrepid pioneers who have actually practised the art of flight.

Among other full-sized machines are the Delagrange and the Bleriot biplanes—the latter a 3-seater—the Bleriot, R.E.P., and Antoinette monoplanes, Kapferer's double monoplane, and the Breguet aeroplane-helicopter. The Wright aeroplane is represented by a full-sized model, but the others above-mentioned are actual machines, and form a collection which is, it will be seen, quite as representative as could be expected under the circumstances, and remarkably interesting to boot.

It is a distinct pity that the official catalogue should have contained no list of these and other exhibits, and in view of the importance which may at any time be asso-



PARIS AERO SALON.—General view of the principal part of the Aviation Section. In the foreground, a little to the left, is a back view of Ader's "Avion," to the right is the R.E.P. monoplane, and opposite to it is the Delagrange biplane. In mid-air is the "Ville de Bordeaux," and in the distance, down the Grande Nef, can be seen part of a spherical balloon.

ciated with such a record, we shall endeavour to remedy the defect as far as possible by compiling a summary. Incidentally, it is interesting simply as a curiosity to reproduce the actual contents of the official catalogue so far as they apply to the present subject. Thus the two lines in the catalogue :—

XXI. Aerostation et Aviation.
Grande Nef.

The public at large, however, was in no way deterred by any lack of official guidance in its ferreting out of the novelties, and during the afternoons and evenings the crowd round the different stands was simply enormous. Adding to the numbers, came parties of schoolboys ; and on one occasion we observed a large band of Esperantists in charge of a guide who explained the different exhibits in the International tongue. At the stand where the Wright machine was exhibited they met with a particularly hearty reception from one of the directors, who himself addressed them in Esperanto. So popular was the exhibition right from the very first that the Administration was solicited to extend its duration ; the terms of the notice in which they announced that they could not do so, we give verbatim as follows :—

"Le Salon de l'Automobile 2e Série, Véhicules Industriels Navigation, Machines-Outils, Premier Salon de l'Aéronautique, fermera irrévocablement ses portes Mecredi soir 30 Décembre.

"De nombreuses demandes de prolongation ont bien été adressées à l'Administration, mais le Commissaire Général, fidéle aux traditions, a décidé de ne point modifier la date de cloture primitivement fixée."

To anyone already interested in the experimental side of the problem of flight it may readily be believed that the Show is open all too short a time for even such a small number of machines to be studied in detail, especially as it is not customary for Englishmen to spend their Christmas holidays in exhibitions. Many from this country, therefore, will doubtless have found themselves unable to be present at all, and will, in view of this, appreciate the information which we are able to set forth in the following pages. We have endeavoured in what follows to give as complete an account as possible of the exhibits in a form convenient for reference now and in the future, but in some cases full particulars have not been available. At the present time flight is only just commencing its career as an industry, and there is in consequence a somewhat similar difficulty in obtaining desired information that there used to be in the early days of the motoring industry, when we were on more than one occasion threatened with the police for our all too-persistent curiosity. The public at large is rigorously excluded from the stands.

Although these are the earliest of days, it is impossible to ignore the fact that the flying industry is already born. It is one of those half-hidden aspects of the present situation which makes itself unobtrusively apparent at the Salon, but might have remained unrealised for a much longer period to come had such an occasion not offered an opportunity for bringing it to light. It is a little apt to be forgotten that the more prominently successful experimenters have been at work for a long time ; it must seem an almost incredibly long time to those who have hardly given a thought to the subject before the latter part of the year that has just terminated. One has only to turn back through the pages of *The Automotor Journal* to appreciate how far even the publicly known efforts in aviation extend ; and, as everyone knows, there is always a vast amount of secret labour in pioneer work which never comes to light until long afterwards.

The history of the Wrights is, happily, already fairly complete, and serves as an undying example of "*labor omnia vincit*" applied to flight. Who would have guessed, however, that it was six years ago that M. Esnault-Pelterie first commenced the work which he has since continued without interruption to the present day? His case is the more interesting since he has not confined himself to any one department ; he has built aeroplanes, designed and constructed a very successful engine, and laid down an aviation factory which has now been working for a year and is at present probably the largest in existence. And yet he is one of the youngest of those in the field ; in fact, M. Pelterie is a "flying engineer" pure and simple, for he commenced his practical career as soon as he had left his regiment—which he joined directly after taking his degree in science—and he has not, like so many others, graduated in an allied industry. We have cited M. Pelterie as an example not only because it is undoubtedly one of exceptional interest, but because it so aptly points the moral of "going slow" at first in a new thing. As M. Pelterie himself remarked to us at the Salon, "Everywhere to-day I hear the same expressions of surprise and wonder at what is on view, followed by optimistic conclusions of further wonders to come *immediately*. I am afraid they are going to go too fast ; they forget our past laborious work."

It is not alone in the fashioning of complete aeroplanes, and in the designing of light engines, that the present Salon has developed an industrial aeronautic side. There is an even stronger proof of our contention that the industry is born, in the fact that there have already sprung into existence some firms who are devoting special attention to the making of parts. Propellers, frames, radiators, and surface materials are among the *pieces detaché* appertaining to flight, and several most interesting and clever inventions have already found practical expression.

Many visitors doubtless expected to find the greater part of the Salon constituted by models, but such is not at all the case. Models there are in plenty, but we can say without prejudice that in general they do not improve upon the standard of the Agricultural Hall exhibits, either as regards ingenuity or workmanship. A few are designed directly at variance to those main principles on which present day "experts" are fairly well agreed—such as for example a model of a machine in which the narrow planes are placed longitudinally—but the majority are nothing but crude conceptions of the modern machines with an additional plane here or there as their sole claim to originality. The flapping-wing machine is in evidence as usual, and is apparently going to be the pet freak of the Flying Salons of the future. Most of the exhibitors in this section have a seedy and dejected air, and are too obviously waiting for some ignorant but kind-hearted philanthropist to place a small sum at their disposal for the development of their ideas ; we imagine that the smallest of donations would be acceptable in most cases. Before proceeding to a more detailed description of the individual exhibits, we purpose devoting a short article to the more general subject of aeroplane construction and design as it is represented by the collection of machines at the Grand Palais. Interesting at any time, such a comparison is all the more important now since this is the first time in history that it has been possible.

AEROPLANE DESIGN AND CONSTRUCTION.

Types.

MONOPLANES have a distinct superiority in numbers over the biplanes at the first Aeronautical Salon, but presumably it is only a matter of individual preference at the present time as to which of the two types has been adopted. The monoplane has of course less surface than a biplane occupying the same width of spread, and is therefore a higher speed machine. It lends itself to simplicity of construction, and if fitted with a tractor screw, as most are, to the use of a direct coupled engine. The absence of transmission chains is, of course, a merit in itself, but the direct drive involves a high-speed propeller, which appears to be attended with other complications. On a monoplane, the size and pitch of a screw of reasonable size appears to render high speed necessary in order to give the velocity required for flight, so to this extent the conditions are in common accord. On the Pischoff monoplane there are two chain-driven propellers placed behind the main wings, as on most biplanes.

Having thus briefly dealt with the types in general, we give below a table summarising the various aeroplanes on view. Among the details included in this list are certain leading dimensions, and also the weight of the different machines in flying order but without the pilot; these latter figures, however, are not such as should be regarded as too literally exact, if the comparative appearances of the aeroplanes themselves may be taken as any guide.

Machine.	Exhibitor.	Details.			
		Spread.	Surface.	Weight.	Engine.
					Monoplanes.
		m.	sq. m.	kgs.	h.p.
Ader's Avion (No. 3)	Arts et Metiers Museum	16	56	258	40 steam
R.E.P. (No. 2 bis)	Etab. R. E. Pelterie ...	9·6	15·7	360	35 7-cyl. R.E.P.
Bleriot (No. 9) ...	Soc. Bleriot	9	24	410	50 16-cyl. Antoinette
Bleriot (No. 11) ...	Soc. Bleriot	7	13	160	35 7-cyl. R.E.P.
Antoinette	Soc. Antoinette ...	12	40	500	50 8-cyl. Antoinette
La Demoiselle ...	Santos Dumont ...	—	9	67	2-cyl.
Pischoff	Pischoff and Koechlin	—	23	—	17 2-cyl.
Vendome (No. 2) ...	R. Vendome	9	26	305	50 3-cyl. Anzani
Clement-Bayard ...	Clement-Bayard ...	12·5	23	400	50 7-cyl. B.-C.
					Double Monoplanes.
Astra (Kapferer) ...	Soc. Surcouf	10	40	—	35 7-cyl. R.E.P.
					Biplanes.
Wright (model) ...	Cie. Navigation Aérienne	12·5	—	450	22 4-cyl. B.M.
Farman (No. 1) ...	Voisin Frères	10·2	52	500	50 8-cyl. Antoinette
Delagrange (No. 3)	Soc. d'Encouragement	10·5	40	450	50 8-cyl. Antoinette
Bleriot (No. 10) (3 seater)	Bleriot...	13	65	480	50 8-cyl. Antoinette
Lejune (No. 1) ...	Lejune...	6·5	23	150	12 3-cyl. Buchet
					Special.
Breguet helicopter-aeroplane	Breguet	14	60	550	50 8-cyl. Antoinette

Installation.

The tractor screw in front, as representing a principle of propulsion, is one to which Sir Hiram Maxim, in his recent book, is strongly opposed, on the ground that it fails to take advantage of the air set in motion by the machine as a whole as a means of neutralising some of the normal slip. On the other hand, M. Esnault-Pelterie, among others, considers that the wake from the slip itself is turned to better account with a tractor screw because it creates a higher effective velocity of the air under the centre of the main wings. The Pelterie monoplane, however, is constructed to make as much use of this central air current as possible, but there are others which are not, and at the best, the frame, whatever its shape, occupies a considerable cross-section behind the screw. At the moment, therefore, it may be said that the engines are usually placed in front of monoplanes because that position makes the best mechanical job of the installation.

On biplanes the engine is either on one side of the pilot, as on the Wright and Bleriot machines, or immediately behind, as on the Farman and Delagrange (Voisin) aeroplanes. In all cases the propellers are just behind the main planes, and on the Wright, where there are two, and on the Bleriot, where there is only one, they are driven by chains. The Voisin machines have a direct drive. When there are two propellers they should turn in opposite directions in order to neutralise the tilting effect, and on the Wright machine this is accomplished by crossing one of the chains. The chains are enclosed in tubes, and as the motor is alongside the pilot one chain is longer than the other; it is this one which is crossed.

Frames.

Wood is the favourite material at the present time for the framework of aeroplanes, and, indeed, it seems likely to give birth to quite a new development of constructive engineering.

Already two firms have specialised in the manufacture of hollow wood beams and struts, and one in particular—the Soc. Anon. Construction d'Appareils Aériens — exhibit some most interesting models of elliptic lattice girders showing great refinement of workmanship. Wood, as is well known, is ordinarily lighter than metal for the same strength, although it is much more bulky.

On an aeroplane the bulk of wood required is not disproportionate to the present size of the machine—whatever it may be in the future—and in consequence it has become a very popular material. Only two notable examples of steel need be referred to, the Breguet and the R.E.P. In the latter case the frame is comparatively small, and in the former it is very extensive, and, in fact, forms an interesting example of tubular steel work quite apart from any reference to its application to the subject under discussion.

Most of the monoplanes have boat-like frames of V section, which gives some of them the appearance of racing skiffs; in a few cases, the sides are actually wood-covered, at any rate in part, but in general the frame is a light skeleton structure covered with fabric. In general, such frames taper in section aft, and either have a bluff end forward or a short sharp point. A feature of the Wright frame is the detachability of the struts between the two main planes; the ends of the struts are fitted with steel screw-eyes, which fasten on to corresponding curled hooks. Diagonal wire stays give the necessary

stiffness in conjunction with the runners, which form a base for the machine as well as a support for the elevator in front.

Surface Materials.

Fabric, made of Egyptian cotton treated with rubber, constructed by the Continental Tyre Co., is a popular surface material for covering the wings of aeroplanes, as it is readily obtainable in any weight and strength, and is impervious to rain. Some of the machines, however, use other things, as, for instance, the Bleriot No. 9, which has a vellum-like paper covering; the Bayard-Clement, which employs varnished silk; and the Antoinette, which uses varnished linen. This latter is hand polished to give great smoothness, and has a fine glossy finish; so, too, has the silk of the Bayard-Clement monoplane, but the fabrics are not usually prepared with a specially smooth surface.

Systems of Control.

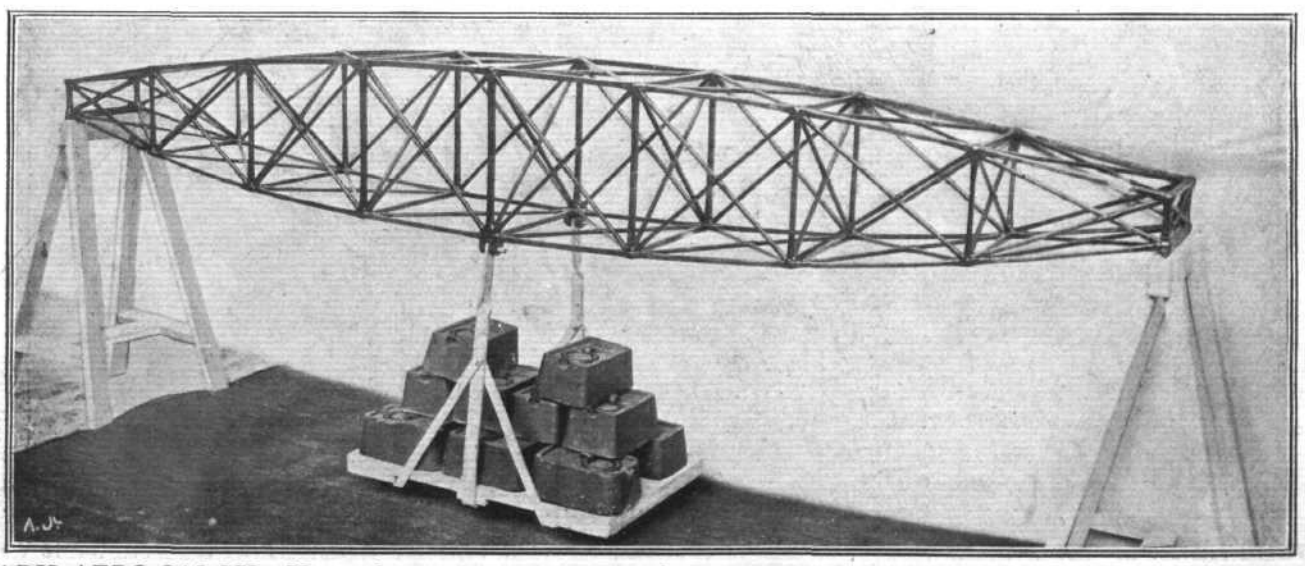
There is no more interesting feature of the aeroplane nor one in which greater differences in detail find expression in practice, than the system of control. Especially is this the case in connection with the steering and elevating levers themselves, all kinds of devices having been adopted by the different inventors as being most in accord with their own individual ideas on the subject. So far as the actual means of manœuvring the machine are concerned, the difference is naturally less marked, for most of them have well-defined rudders and elevators.

In the monoplane type of machine there is greater variety in the details of control than with the biplanes, the differences in the latter class being mainly concerned with the placing of the rudder aft and elevator forward, or *vice versâ*. On the monoplanes, however, the main wings themselves are generally brought into play in one way or another, either by total flexion or warping as on the R.E.P. and Vendôme aeroplanes, or by the use of steering tips as on the Bleriot No. 9 and Antoinette. In the R.E.P. monoplane the warping of the wings in opposite directions simultaneously serves for all ordinary manœuvring without resorting to the rudder, which is under the control of a separate lever. Rising and falling is accomplished by tilting the elevator by a to-and-fro motion of the same pivoted lever which warps the wings. On the Vendôme monoplane each wing is warped by a separate lever, and as these levers are very massive and pronounced, standing out well above the frame, the pilot must assume somewhat the same attitude as is presented by the driver of a traction engine, who is ordinarily seen wending his way with each hand firmly grasping a handle.

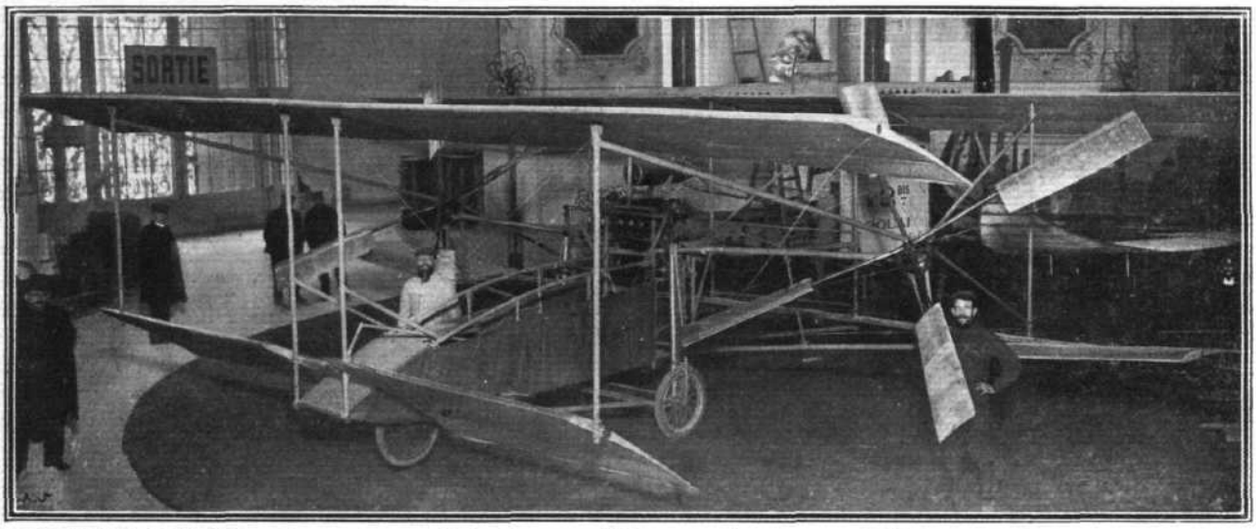
Although, as in the R.E.P. monoplane, the warping of the wings is used for the purpose of steering, it is necessary to draw a distinction between such arrangements and the rudder pure and simple, because for the most part they are provided to assist in maintaining stability, quite apart from any use which they may have for governing direction. It is in this capacity, too, that the designers regard the use of steering-tips, which consist of small pivoted extremities attached to the ends of the main wings. Being at a great distance from the centre of the machine, they have a considerable leverage, and, operating as they do upon both sides of the centre simultaneously, the rapidity with which they are able to produce an effect is enhanced. It is, therefore, upon this device that the pilot mostly relies to keep his equilibrium. The warping of the main planes is, as our readers know, one of the great features of the Wright aeroplane; but in the machine exhibited, the movement is accompanied by a turning of the rudder; the elevator on the Wright aeroplane is under the control of a separate lever.

As to the levers themselves, custom differs widely, as we have already mentioned. Wright (on the machine exhibited) uses two simple rods, one hinged to rock laterally for steering, the other to move to and fro for rising and falling. In the Farman, Delagrange, and Kapferer aeroplanes, the pilot clutches a steering wheel similar to that used on a motor car, but placed in a vertical plane; for steering, it is turned as on a boat, while for varying the altitude of flight it is pulled or pushed bodily to and fro. Such a system as this, it will be observed, allows either or both hands to do all the work that is required. On the R.E.P. and Breguet machines the system of single-lever control has been restricted to the pilot's left-hand, the lever in question on the R.E.P. monoplane being pivoted universally to move in any direction; while the Breguet system is to fit the elevating lever with a rotary handle which is twisted for the purpose of steering.

In the following tabular summary, brief particulars, so far as they are available, are given of the methods of control adopted on the various aeroplanes exhibited :—



PARIS AERO SALON.—View of a model girder made of wood, by the Société Construction d'Appereils Aeriens.



PARIS AERO SALON.—General view of the Breguet Helicopter-Aeroplane. The large inclined screws are visible in this illustration, as also is the transverse arrangement of the engine; but the machine as a whole is so large and in such an awkward position that it is impossible to convey a comprehensive idea of its construction by means of a photograph.

One Hand Control.

"Bleriot No. 9."—Pivoted lever, fitted with steering-wheel handle, to and fro to ascend (elevator), sideways to turn (rudder and steering tips).

"Voisin" (Delagrange and Farman).—Vertical steering-wheel, rotate to turn (rudder), pull and push to go up or down (elevator).

"Astra" (Kapferer).—Same as "Voisin."

"R.E.P."—Three levers. One pivoted, to and fro to ascend (elevator), sideways for stability and to steer (warp wings), one to set rudder, one to set elevator.

Hand and Foot Control.

"Bleriot No. 10."—Pivoted lever fitted with steering-wheel handle. To and fro to ascend (elevators), sideways for stability and to turn (elevators); foot rudder.

"Bleriot No. 11."—Pivoted lever as on No. 10. To and fro to ascend (elevators); sideways for stability and to turn (warp wings); foot rudder.

"Breguet."—Hinged lever with pivoted handle, to and fro to ascend (elevator), rotate handle to turn (rudder), foot operates extra steering planes.

"Vendome."—Three levers and two pedals all separate. Two levers to warp wings, separately or together (steering or ascending); one lever to set tail (long ascents); two pedals to work steering tips separately (sharp turning).

Two-Hand Control.

"Antoinette."—Rudder operated by ropes; steering tips by another rope; elevator by a wheel at the pilot's side.

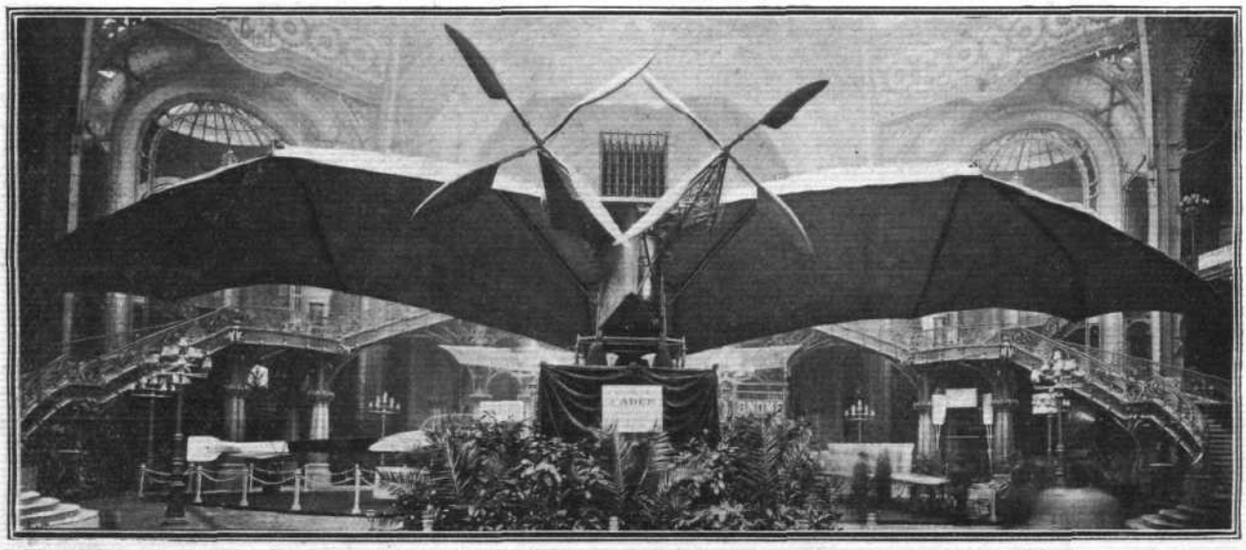
"Clement."—One lever and one wheel; lever for elevator, wheel for rudder.

"Wright."—Two levers; one for elevator, one for rudder and warping wings.

Ader—A Pioneer.

In the electrical world, the name of M. Ader is one of renown for his valuable work in connection with telephones; in the new realm of flight he has an almost equal claim to respect, for he was an early pioneer who not only diligently laboured to attain the conquest of the air, but actually achieved some measure of success. It is on record that he flew a distance of 50 metres on October 9th, 1890, in the grounds of the Chateau d'Armain villiers, and subsequently, on October 14th, 1897, he flew a distance of 300 metres at Satory before a committee of army officers delegated by the French Government to witness the trial.

The machine was undoubtedly in the air—as shown by the absence of wheel tracks in the wet ground—while it travelled this latter distance, but its direction of flight was, owing to a strong cross-wind, far from the circular course marked out, and this fact, coupled with the damage done to the machine in landing, doubtless led



PARIS AERO SALON.—Front view of Ader's "Avion No. 3." The bird-like appearance of the machine is well shown, as also are the curious feather propellers.

the principal officials to take a gloomy view of its prospects. At any rate, the Government refused to continue its financial assistance to the inventor, and M. Ader had reluctantly to abandon his favourite work.

The histories of many pioneers are sad, especially if they are before their time—and Ader was certainly that. Being a Frenchman, he was born in a sympathetic land, however, but even so, he was very fortunate to get so far as to gain the assistance of the Government at such an early stage in the proceedings. M. Ader himself was an enthusiast on flight from boyhood, and was of course, therefore regarded by many as a mere dreamer. That was in the days before he became sufficiently wealthy as an electrical engineer to put some of his ideas into practice. To modern eyes, his attempts seemed doomed to failure, it is true, but he did his best with the materials at his disposal, and his name unquestionably deserves to go down to history among those of the great. And, although he himself is now perhaps past taking an active interest in modern work, his engineer, M. Espinosa, is actively engaged in the industry.

His Avions.

Ader built three flying machines, and it is the last of these that has been taken from the museum of the Arts et Metiers to grace the first Aeronautical Exhibition; the others no longer exist. His first machine he called "L'Eole," and with that he achieved the flight of 50 metres in 1890; the third machine, on view in the Grand Palais, is the "Avion," with which he demonstrated before the French Government in 1897.

It is a machine of the monoplane type, constructed to resemble a bird in its general shape. Its wings are deeply cambered and arched, and their surface material is stretched over an elaborate framework, presumably intended as a copy of the natural formation of a bird's wing. The wings have a total spread of 16 metres, and present an area of 56 sq. metres; they extend on either side of the body, and are so mounted that they can be swung forwards or backwards slightly in order to shift the centre of pressure relatively to the centre of gravity when desiring to ascend or descend. Beneath the rear portion of the wings, which extend far back in the centre, is a rudder controlled by pedals.

The mechanism, all of which is carried by the main body, consists of a multi-tubular alcohol-fired boiler and two horizontal compound engines. The boiler was rated at 40-h.p., and, when working at 10 atmospheres (140 lbs. per sq. in.), the steam in the dome was usually about 215 degrees C. The engines are placed in front with their cylinders horizontal and their crankshafts longitudinal. Each is coupled direct to the shaft of a tractor screw. They are compound engines with two high-pressure and two low-pressure cylinders each, the dimensions being 65 and 100 mm. bore by 100 mm. stroke. At the normal boiler pressure they developed 20-h.p. each at a speed of 600 r.p.m.; their weight is 21 kilogs. each.

The propellers are most peculiar, for they resemble nothing so much as eight gigantic quill pens arranged in two sets of four. The blades are, in fact, imitation feathers, and are made of bamboo. Each propeller is three metres in diameter, and has a pitch approximating to three metres (it is impossible to give an exact figure with such a form of construction). Their position is such, too, that they overlap one another considerably, and it appears as if that on the port side must have been working under difficulties.

Quite the most interesting fact about the "Avion" is that its entire weight was only 258 kilogs. This is due to the use of nothing but wood in the construction of the framework, and a system of making the joints and employing hollow struts and beams was thought out by M. Ader for the purpose; it is the same as is now put into practice by the Soc. Cons. d'Appareils Aeriens, of which M. Espinosa (M. Ader's engineer) is a Director.

"Ville de Bordeaux."

An airship built by Soc. Surcouf for military work, but if not accepted by the Army, to go to the Soc. Aerienne, who purpose using it for pleasure-trip service. It is one of the noteworthy series, "La Ville de Paris," "Clement-Bayard," "Col. Renard," and "La Ville de Nancy."

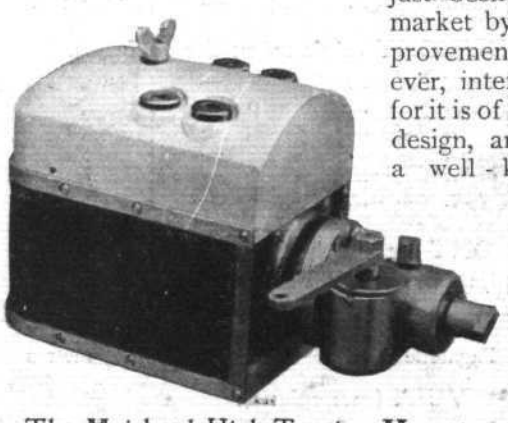
The gas-vessel, which is made of "Continental" fabric, is 53 metres long and 15 metres in diameter; it holds 3,000 cu. m. of gas, and contains an air ballonette which maintains the pressure at 45 mm. water-gauge under all atmospheric conditions. The engine is an 80-h.p. 4-cyl. Renault, and is mounted on four quarter-elliptic leaf-springs placed transversely and shackled to the car. The propeller is 5 m. in diameter, and 3·6 m. in pitch; it runs at 360 r.p.m., being geared down from the main shaft. In front of the car is a triplane elevator having a surface of 16 sq. metres, and behind is a double rudder for steering. Stability against pitching and rolling is provided for by a group of four pear-shaped gas-bags surrounding the rear end of the main envelope.

The car itself was made by Messrs. Esnault-Pelterie, and is mainly of tubular steel work; it is 28 metres long. The envelope is made of "Continental" yellow fabric, and its maximum diameter is well forward; there is, however, not much difference in the diameter along most of the centre part of the envelope. In front it terminates in a short sharp cone, and behind, in a longer cone with a hemispherical end. To serve as an attachment for the car cords, a strip of wood-cored canvas is sewn to the envelope. The cords are lashed to this, and the car is hung from the cords by steel wires.

⊛ ⊛ ⊛ ⊛

A NEW BRITISH MAGNETO.

THERE are, comparatively speaking, so few makers of magnetos in this country that the advent of a new British-built machine is a matter of moment. That which has just been placed on the market by the Motor Improvements Co. is, however, interesting in itself, for it is of quite an original design, and is made by a well-known firm of electrical engineers—Messrs. Muirhead. Incidentally, it may be mentioned, the makers' confidence in its reliability has led them to guarantee the material and workmanship for three years. A detailed description of its construction will be included in our series of magneto articles in due course.



The Muirhead High-Tension Magneto.

PROGRESS OF MECHANICAL FLIGHT.

PROGRESSIVE RECORDS.

THE following table is interesting as showing the gradual progress of the solution of the problem of mechanical flight :—

Distance or Time.	Place.	Aeronaut.	Date.
300 metres	Satory	Ader	14 Oct., 1897
Few seconds	Bagatelle	Santos Dumont	22 Aug., 1906
7–8 metres	,,	,,	14 Sept., 1906
50 metres	,,	,,	24 Oct., 1906
60 metres	,,	,,	13 Nov., 1906
82·6 metres	,,	,,	,, ,, ,,
220 metres	,,	,,	,, ,, ,,
363 metres	Issy	Henry Farman	26 Oct., 1907
403 metres	,,	,,	,, ,, ,,
771 metres	,,	,,	,, ,, ,,
1·500 kiloms.	,,	,,	13 Jan., 1908
2·004 kiloms.	,,	,,	21 Mar., 1908
2·5 kiloms.	,,	Delagrange	10 April, 1908
3·925 kiloms.	,,	,,	11 ,, ,,
5 kiloms.	Rome	,,	27 May, 1908
9 kiloms.	,,	,,	,, ,, ,,
12·5 kiloms.	,,	,,	30 ,, ,,
17 kiloms.	Milan	,,	22 June, 1908
19·7 kms. (20m. 19s.)	Gand	Henry Farman	6 July, 1908
24·727 kms. (29m. 53s.)	Issy	Delagrange	6 Sep., 1908
57m. 31s.	Fort Meyer	Orville Wright	9 ,, ,,
1h. 2m. 30s.	,,	,, ,,	,, ,, ,,
1h. 5m. 57s.	,,	,, ,,	10 ,, ,,
1h. 10m. 50s.	,,	,, ,,	11 ,, ,,
1h. 15m. 20s.	,,	,, ,,	12 ,, ,,
1h. 31m. 25s.	Auvours	Wilbur Wright	21 ,, ,,
1h. 54m. 22⅘s.	Le Mans	,, ,,	18 Dec., 1908

Wilbur Wright holds the record for passenger flight, having carried M. P. Painlevé for 1h. 9m. 45s., and covering a distance of about 80 kiloms. at Auvours on October 10th.

INDIVIDUAL PERFORMANCES TO DATE.

THE accompanying table gives the performances which have been made by the most prominent aviators of the last few years :—

Date.	Place.	Duration.	Distance.
ADER.			
		h. m. s.	
14 Oct., 1897	Satory	—	300 metres
SANTOS DUMONT (biplane, rudder in front).			
22 Aug., 1906	Bagatelle	—	Few metres
14 Sept., 1906	,,	0 8 0	,,
24 Oct., 1906	,,	—	50 metres
13 Nov., 1906	,,	—	60 ,,
,, ,,	,,	—	82·6 ,,
,, ,,	,,	0 0 21⅕	220 ,,
SANTOS DUMONT (second biplane, with rear rudder).			
17 Nov., 1907	Issy	—	200 metres
SANTOS DUMONT (monoplane).			
21 Nov., 1907	Bagatelle	—	145 metres
VUIA (monoplane).			
8 Oct., 1906	Issy	—	5 metres
Mar. 1907	Bagatelle	—	5 ,,
17 July, 1907	,,	—	60 ,,
DE LA VAULX (monoplane)			
18 Nov., 1907	St. Cyr	—	60 metres
DELAGRANGE (biplane).			
16 Mar., 1907	Bagatelle	—	10 metres
30 ,, ,,	,,	—	200 ,,
16 ,, 1908	Issy	—	600 ,,
20 ,, ,,	,,	—	,, ,, *
21 ,, ,,	,,	—	1·5 kiloms.
24 ,, ,,	,,	—	,, ,,
10 April, 1908	,,	—	2·5 ,,
11 ,, ,,	,,	—	3·925 ,,
27 May, 1908	Rome	—	9 ,,
30 ,, ,,	,,	0 15 25	12·5 ,,
22 June, 1908	Milan	—	17 ,,
9 July, 1908	Turin	—	200 metres†
6 Sept., 1908	Issy	0 29 53⅘	24·727 kms.
17 ,, ,,	,,	0 30 27	—
BLERIOT (monoplane).			
5 April, 1907	Bagatelle	0 6 0	—
11 July, 1907	,,	—	30 metres
25 ,, ,,	Issy	—	150 ,,
6 Aug., 1907	,,	—	143 ,,
17 Sept., 1907	,,	—	186 ,,
1 Dec., 1907	,,	—	—*
4 ,, ,,	,,	—	200 metres
6 ,, ,,	,,	—	600 ,,
17 June, 1908	,,	—	600 ,,
29 ,,	,,	—	700 ,,
4 July, 1908	,,	0 5 47	6 kiloms.
6 ,,	,,	0 8 45	—
21 Oct., 1908	Toury	—	7 kiloms.
31 ,,	,,	0 11 0	14 ,,‡
FARMAN (biplane).			
15 Oct., 1907	Issy	—	285 metres
26 ,,	,,	—	771 ,,*
30 Dec., 1907	,,	—	—
13 Jan., 1908	,,	0 1 28	1·5 kiloms.
21 March, 1908	,,	—	2·004 ,,
29 ,, ,,	Ghent	—	138 metres†
2 June, 1908	,,	—	1·241 kms.†
6 July, 1908	,,	0 20 19⅘	19·7 ,,
29 Sept., 1908	Chalons	0 42 0	39 ,,
30 ,, ,,	,,	0 43 0	41 ,,
2 Oct., 1908	,,	0 44 32	40 ,,
28 ,, ,,	,,	0 4 0	2 ,, †
30 ,, ,,	,,	0 17 0	27 ,,
31 ,, ,,	,,	Height prize, 25 metres	
ESNAULT-PELTERIE (monoplane).			
19 Oct., 1907	Buc	—	(first flight)
22 ,, ,,	,,	—	30 metres
27 ,, ,,	,,	—	150 ,,
8 June, 1908	,,	—	1·2 kiloms.
DE PISCHOFF (biplane).			
17 Dec., 1907	Issy	—	500 metres
GASTAMBIDE-MENGIN (monoplane).			
8 Feb., 1908	Issy	—	6 metres
12 ,, ,,	Bagatelle	—	150 ,,
21 Aug., 1908	Issy	0 1 30	1·6 kiloms.
GRAHAM BELL (biplane).			
12 Mar., 1908	Hammondsport, N.Y.	—	318 ft.
4 July, 1908	,, ,,	—	3,420 ft.
CORNU (helicopter).			
26 Mar., 1908	Coquainvillier	(machine raised itself 40 cm. from earth)	
BREGUET (helicopter aeroplane).			
22 July, 1908	Donai	—	20 metres
MOORE-BRABAZON (biplane).			
3 Dec., 1908	Issy	—	600 metres
VANIMAN (triplane).			
18 Dec., 1908	Issy	—	150 metres

WILBUR WRIGHT (biplane).

8 Aug., 1908	...	Hunaudières...	...	0 1 45	—
11 ,, ,,	...	,,	...	0 3 43	—
12 ,, ,,	...	,,	...	0 6 56	—
13 ,, ,,	...	,,	...	0 8 13⅖	—
3 Sept., 1908	...	Auvours	...	0 10 40	—
5 ,, ,,	...	,,	...	0 19 48⅖	—
10 ,, ,,	...	,,	...	0 21 43⅖	—
16 ,, ,,	...	,,	...	0 39 18⅖	—
,, ,, ,,	...	,,	...	0 2 20 †	—
21 ,, ,,	...	,,	...	1 31 25⅘	—
25 ,, ,,	...	,,	...	0 9 1⅗	—
28 ,, ,,	...	,,	...	0 11 35 †	—
3 Oct., 1908	...	,,	...	0 55 37⅖†	—
6 ,, ,,	...	,,	...	1 4 26⅕†	—
10 ,, ,,	...	,,	...	1 9 45⅖†	—
18 Dec., 1908	...	Le Mans	...	1 54 22⅖	—

FERBER (biplane).

12 Aug., 1908	...	Issy	...	—	First flight.
19 ,, ,,	...	,,	...	—	256 metres.
,, ,, ,,	...	,,	...	—	500 ,,

ORVILLE WRIGHT (biplane).

9 Sept., 1908	...	Fort Meyer (U.S.A.)		0 6 0†	—
,, ,, ,,	...	,,	,,	1 2 30	—
10 ,, ,,		,,	,,	1 5 57	—
11 ,, ,,	...	,,	,,	1 10 50	—
12 ,, ,,	...	,,	,,	1 15 20	82 kiloms.
,, ,, ,,	...	,,	,,	0 9 6†	—

DE CATERS (triplane).

26 Oct., 1908	...	Brussels	... ...	—	800 metres.

ZIPFEL (biplane).

24 Nov., 1908	...	—	—	200 metres.
1 Dec., 1908	...	—	—	1,000 ,,
9 ,, ,,	...	—	—	1,500 ,,

* First attempt at turning.
† With passenger.
‡ Flight across country.
m. = metres.
kms. = kilometres.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

THE following correspondence was addressed to the Editor of *The Automotor Journal* this week, but as the matters contained therein are of peculiar interest to the readers of FLIGHT, we need make no apology for reproducing them by way of inaugurating our correspondence columns. We hope to make our correspondence columns a regular and interesting feature of FLIGHT, and we would again remind our readers not to hesitate in sending us communications regarding the many questions which must come under discussion during the early days of the industry.—ED.

WHAT IS AN AERODROME?

SIR,—I regret to see that the misuse of the word "aerodrome" is receiving your support in your columns.

This word was invented by Langley and applied by him as meaning a flying machine of the "aeroplane" type; it is in this signification quite regular in its definition, and at the present time constitutes a part of the English language (see recent editions of Webster's and other dictionaries).

I suppose because a hippodrome is a big open space for horses, you think that an aerodrome should be a big open space for flying machines (or rather, I should say for *air*), but as this is not the signification, the idea is not well founded.

You will find in a footnote to the preface of my "Aerodynamics" the remark:—The word aerodrome has been grossly misapplied by Continental writers to denote a balloon shed; shall I have to add "and by home writers to denote a ground or space for exhibition flights."

I do not know whether you wish to be taken for the kind of man who says a thing is "chronic" simply because it is very bad, but this should not be the ambition of a leading motor paper.

Excuse my bluntness, but do not let us have a dozen meanings to one word, one meaning is enough if that is the right one.

Yours faithfully,
F. W. LANCHESTER.

[Mr. F. W. Lanchester is quite right in saying that we have used the term "aerodrome," editorially, to signify a piece of land set apart for the trial of flying machines, or for the holding of races with flying machines, as the case may be. We consider, moreover, that such use of the term is fully justified by analogy with "hippodrome," which Webster gives as being derived from the Greek ἵππος = horse, and δρόμος = course; *i.e.*, a place set apart for equestrian and chariot races; a circus. While the root derivation of the expression "drome" is δραμεῖτ = to run, and as such might perhaps have been better suited to form an adjective qualifying the noun with which it is compounded—as Mr. F. W. Lanchester suggests it should do in the case of "aero-drome"—custom has, it will be seen, already established a prior claim in the other direction which we have indicated. With all respect, therefore, both to Professor Langley and to Mr. Lanchester, we think that it is more in the natural course of things to let the word "aerodrome" denote a "flight-ground," than it is to change the accepted meaning of "hippodrome," and of "motodrome" to "horse-drawn vehicle" and to "motor car," respectively.—ED.]

SIR,—As a humble student of aeronautical science, I should feel much obliged if you will explain the meaning of the term "aerodrome" as used in your issue of the 19th inst.

The definition of this word given in one of your contemporaries is as follows:—

"Aerodrome (an air runner), firstly used by Professor Langley, is the most suitable and comprehensive word used to denote a flying machine of any kind. It should never be used in the meaning of a balloon shed. . . ."

On page 1666 of the issue in question, you use it in the sense of a flying machine. "The most successful types of flying machines or aerodromes at present in existence, &c., &c.," whilst on page 1662, under the headings respectively of the Juvisy and Lannemazan aerodrome, you refer to it as a sort of "space" or ground for the purpose of practising aerodromics. Now I submit that the word aerodrome cannot stand both for a flying machine and an open piece of ground, and in the interests of aeronautical terminology I should be glad if you will explain how this term can be used to convey two such different meanings. Enclosing my card,

I remain, Sir, IGNORAMUS.

[The answer to "Ignoramus" will, for the most part, be found in our note which follows Mr. Lanchester's letter on the same subject. Otherwise it is only necessary to explain that the paragraphs referred to on page 1662 were editorial, whereas the article referred to on page 1666 of *The Automotor Journal* was written by Mr. Lanchester.—ED.]

PROGRESS IN FLIGHT.

SIR,—It is with great pleasure that I read the article in last week's issue by Mr. F. W. Lanchester, on the merits of the two machines made by the Voisin Frères and Wilbur Wright.

I think it is a pity that the fact that the Voisin machine was invented, built, and made to fly by Voisin is not more prominently stated in other journals, as it is popularly supposed that credit attached to Farman, whereas all the credit should be given to the Brothers Voisin.

Owing to a quarrel the Voisins had with the French press, the papers abroad make a point of avoiding their name as much as possible; but in England, where, happily, the news department of a paper is not directly affected by advertisements, there is no reason why justice should not be done to the two brothers who have done so much for France in aeronautical matters.

I write this to your paper, Sir, because I believe the time has come when you should slightly alter the name of your paper to include aeronautics.

THE AUTOMOTOR JOURNAL has been always the paper which has shown most sympathy with the movement, and when at last our sleepy countrymen are awakening to the fact that the aeroplane has come to stay, and in future must be reckoned with as a factor in modern civilisation, the time is at hand when your paper should take advantage of the work it has done in the past and reap the reward.

When motor cars were in an empiric stage they were interesting to many people, but now motor cars and their construction must be put aside under the head of engineering, and left to develop as any other industry.

In the aeroplane we have something new, something that is not standardised down, and commercialised so far as to have aero-taxis and aero-buses. No doubt it will soon come, but, in that that stage has not yet come, it is, therefore, an epoch the more interesting by far; and what better thing could your paper do than foster and encourage the movement in this country?

I have, perhaps as much as anybody, known the difficulties of constructing a machine in England, where everyone is so ready to discourage one, ridicule one, and look upon one as an amiable lunatic; but thanks to Wright and Voisin, who have shown that it is possible to fly, I hope that state of affairs has passed, and that anyone building a machine in England will be surrounded by a band of enthusiasts ever ready to help and encourage an inventor, however crude his machine may be.

It is this trait in the French character which produces men like Bleriot, Esnault-Pelterie, Ferber, Levavasseur and many others. They are continually urged to go on building, while in England the poor inventor is laughed at.

My advice to anyone about to build a machine is to do it in France; there he will find the enthusiasm without which it is so difficult to really make a machine fly; remember it took Voisin six months to make Farman's machine fly, experiments being made every morning.

Picture an inventor testing a machine every day for six months in England trying to make it fly! What sort of treatment would he have got? Ridicule, discouragement, and finally would have been called an imposter, a crank and a lunatic.

Therefore, Sir, I entreat you, by your work already begun so ably, to continue to educate a certain section of the public with whom you are in touch to a state of mind not altogether sceptical as to the final "conquest of the air."

With this end in view I have asked you to change the title of your paper, so as to show you *recognise* the movement and are *alive* to it; and if this suggestion seems to you in any way impertinent, I apologise most humbly, but I do it because I wish to see your paper rewarded for its past work, which has been so much appreciated by

Yours truly,

J. T. C. MOORE-BRABAZON.

20th Dec.

[We need hardly say that we very greatly appreciate Mr. Moore-Brabazon's remarks about THE AUTOMOTOR JOURNAL, as also the suggestion which he makes as to change of title. What we deem to be an even more satisfactory course has, however, been taken by us instead, arrangements having for some time been in progress for the production of a special aeronautic paper from this editorial office. Commencing with the present week—the first of 1909—"FLIGHT," issued by the Proprietors of this Journal, will be obtainable through all the usual news agency channels. In "FLIGHT" will be found, week by week, all the aeronautic news which constitutes one of the regular features of THE AUTOMOTOR JOURNAL, together with other articles of special interest to everyone following the movement.—ED.]

⊛ ⊛ ⊛ ⊛

THE WRIGHT AND VOISIN TYPES OF FLYING MACHINE.*

A COMPARISON BY F. W. LANCHESTER.

THE most successful types of flying machine or aerodrome at present in existence are those constructed by the Brothers Orville and Wilbur Wright, of the U.S.A, and by MM. Voisin Frères, of Billancourt, Seine, France (on the outskirts of Paris). The author of the present paper has recently had opportunities of witnessing both types of machine in flight, the former at the Champ de Manœuvres at Champagné, near Le Mans, the latter, in the hands of Mr. Farman, over the ground of the military camp at Mourmelon le Grand, near Chalons.

Although accurate information is on some points difficult to obtain, the reticence shown is perhaps no more than might be anticipated. The author has succeeded in collecting sufficient data to be able to give a consistent account of the performance of both machines, and to permit of an intelligent comparison being made between the two systems.

The Wright Machine—Origin and Description.

The Wright machine can, metaphorically speaking, trace its ancestry back to the gliding apparatus of Otto Lilienthal; according to Gustave Lilienthal (brother of the famous aeronaut) two Lilienthal machines were sent to the United States, one to Octave Chanute, the other to Herring; Chanute and Herring are said to have been associated in their experimental work. The gliding machine, originated by Lilienthal, was improved, especially as to its structural features and its method of control, successively by Chanute and the Brothers Wright, until the latter, by the addition of a light weight petrol motor and screw propellers, achieved, for the first time in history, free flight in a man-bearing machine propelled by its own motive power.

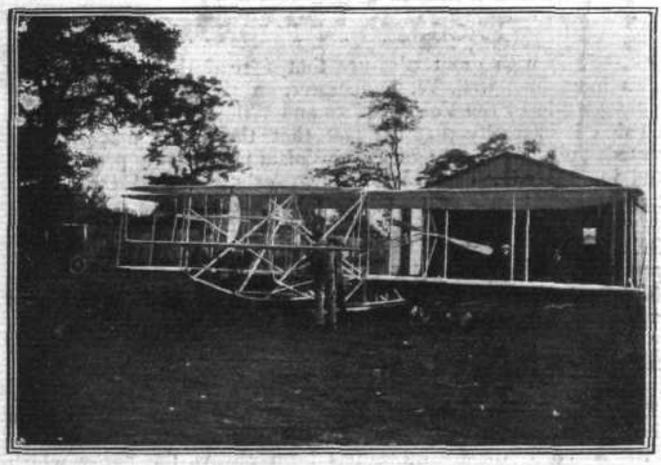


Photo by J. Theodoresco, Paris.

The Wright Machine outside its shed.

The Wright machine of the present day weighs complete, when mounted by aeronaut, 1,100 lbs. (500 kilogs.), and has a total supporting surface measuring approximately 500 sq. ft., the ordinary maximum velocity of flight is 40 miles per hour or 58 ft. per sec. (= 64 kiloms. per hour). The aerofoil consists of two equal superposed members of 250 sq. ft. each, the aspect ratio (lateral dimension in terms of fore and aft), is 6·2, the plan form is nearly rectangular, the extreme ends only being partially cut away and rounded off. The auxiliary surfaces consist of a double horizontal rudder placed in front, and a double vertical rudder astern, also two small vertical *fixed* fins of half-moon shape, placed between the members of the horizontal rudder. The total area of these auxiliary surfaces is about ·3 of that of the aerofoil, or say 150 sq. ft.

The Wright machine is propelled by two screws of 8 ft. 6 in. diameter (2·6 metres), and so far as the author has been able to estimate the *effective* pitch is somewhat greater, being about 9 ft. or 9 ft. 6 ins. These propellers are mounted on parallel shafts 11 ft. 6 ins. (3·5 metres) apart, and are driven in opposite directions by chains direct from the motor shaft, one chain being crossed. The number of teeth of the sprocket-wheels, counted by the author, gave the gear ratio 10 : 33.

The motor is of the 4-cyl. vertical type, the cylinder dimensions being variously given as from 106 to 108 mm. diameter by 105 to 102 mm. stroke, the probable dimensions being in inches 4¼ in. by 4 in. The total weight of the motor is reputed to be 200 lbs. (90 kilogs.), and its power is given as 24 b.h.p. at a normal speed of 1,200 revs. per min. According to another source of information it is capable at a speed of 1,400 revs. of developing 34 b.h.p.; the two statements do not altogether agree.

In conversation, the author understood Mr. Wright to say that he could fly with as little as 15 or 16-h.p., and that his reserve of power when unaccompanied amounted to 40 per cent.† His gliding angle he said was about 7 degrees.

The Voisin Machine. Origin and Description.

MM. Voisin began their experimental work some years before their name was known to the general public, or rather some years before their machines came into public prominence through the exploits of Farman and Delagrange, for comparatively few people, even at the present time, are even aware of the name of the makers of these most successful machines. In 1904, MM. Voisin con-

* A paper read before the Aeronautical Society of Great Britain, December 8th, 1908.

† The author is of opinion that although there may be nothing altogether inexact in this statement, it is, unless qualified in some way, capable of conveying an erroneous impression.

structed for M. Archdeacon some cellular kites of a large size, of very much the form of their present type of machine; these were tested in tow of a motor launch on the Seine, and provided much of the data that MM. Voisin afterwards utilised in the construction of the actual flying machines that brought their work into public prominence.

MM. Voisin and their engineer or works manager M. Colliex, who is largely responsible for their designs) make no secret of the fact that they have based their work on that of pioneers such as Lilienthal, Langley, and others, and in fact they say that they never miss an opportunity of utilising any information or data on which they can lay hands. On the other hand, much of their work is based on their own researches; they appear to take little for granted, having equipped themselves with an "artificial wind" apparatus, with which they test itheir work on a small scale before finally settling a design.‡

The Voisin factory is on a comparatively small scale; the output and work in hand at date includes (amongst others) some five machines of the Farman-Delagrange type, and four machines of a modified

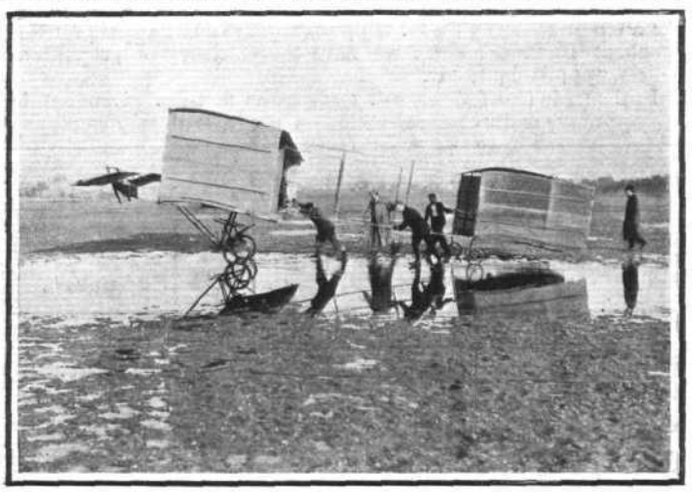


Photo by J. Theodoresco, Paris.

Side view of the Voisin-Delagrange biplane.

pattern, with an aerofoil consisting of three superposed members. The former is the only type of machine for which flight data are to hand, and in the remarks that follow it is this type to which reference is made as the *Voisin machine*.§

It appears from statements made to the author by MM. Voisin (and confirmed by Mr. Farman himself) that when their designs were prepared, the first order they obtained was from M. Delagrange and the second from Mr. Farman, who placed his order for what was practically a duplicate machine. That Farman made successful flights before Delagrange was due in the main to the fact that he had made in advance appropriate arrangements for testing and trials on the Champ de Manœuvres at Issy-les-Moulineaux, a precaution that the latter neglected, and it would seem that it is hopeless to attempt to fly, at least with a new machine, without some such provision. It also appears that the Delagrange machine went through some kind of a history in its early state, the wheels fitted in the first instance not being arranged as it was subsequently found necessary to arrange them, namely, as castors, or as the French express it, "orientable." It is this provision that takes care of any slight side component of the wind when starting and alighting which might otherwise upset the machine.

The Voisin machine is given as weighing complete, with Mr. Farman "up," 1,540 lbs. (700 kilogs.), and has a total supporting surface of 535 sq. ft., this being the combined area of the horizontal members of the aerofoil and the tail, both being used for sustentation, though there are reasons for supposing that the pressure per sq. ft. on the aerofoil is greater than on that of the tail.

‡ It is of interest to note that MM. Voisin and their staff are entirely responsible for the design of their machines, and *guarantee that they will fly*. The purchaser pays for his machine in part as a deposit, and the remainder *when the machine has actually flown*. It is time that the false impression that has been conveyed to the public by the Press should be dispelled. Messrs. Delagrange and Farman (Voisin's first customers) had no more to do with the design of their machines than the purchaser of a motor car from the manufacturer.

§ So far as the author is informed, the "triplane" type of Voisin machine (Goupy 1), has not performed so well as the earlier model (Farman type) though this may be due to the short time that it has been in the hands of the aeronauts. The author believes that the three members of the aerofoil are relatively too close to one another for best efficiency; their aspect ratio also is not good. Beyond this the position of the propeller (in front) is one not conducive to the best efficiency, and the race of the propeller in such a position may materially add to the body resistance.

The ordinary maximum velocity of flight is approximately 45 miles per hour, or 66 ft. per sec. (=72 kiloms. per hour).

In addition to the horizontal sustaining members of the aerofoil and tail there are a number of vertical members whose function is to preserve and control the direction of flight, and to give lateral stability; these have a total area of approximately 255 sq. ft.

The supporting surfaces of both aerofoil and tail are of rectangular plan form, the former being 10 metres by 2 metres, and, therefore, having an aspect ratio = 5. The aspect ratio of the tail members is 1·25; they are, therefore, nearly square.

The Voisin machine is propelled by a single screw of 7 ft. 6 in. diameter (2·3 metres), of which the *effective* pitch is approximately 3 ft. (the actual pitch is much greater, the "slip" being excessive). The propeller is keyed direct to the motor shaft.

The motor fitted to the Voisin (Farman) machine is an 8-cyl. "Antoinette," 4·35 ins. diameter by 4·15 ins. stroke (110 mm. by 105 mm.), stated to give 49 b.h.p. at 1,100 revs. per min.; its weight is given as 265 lbs. (120 kilos.).

It is said that the gliding angle of the Voisin machine was at first approximately 1 : 5 or 11 degrees, but that by detail improvements in diminishing framework resistance by rounding off and covering in to form stream-line sections, the gliding angle has been improved, and is now about ·16 radian, that is between 1 : 6 and 1 : 7, or 9 degs. approximately.

Comparison of the Two Machines.

Weight.—The first point to which we may direct our inquiry is that of the difference of weight; the Voisin machine is 40 per cent. heavier than that of the Brothers Wright. Since the passenger accommodation of the two machines is almost identical (both machines have shown themselves capable of raising one person of ordinary size in addition to the aeronaut), it might be supposed that the less weight of the Wright machine is a definite advantage; in fact, it might be thought that the less weight betokens more scientific design; claims in this direction have, in fact, from time to time been made.

There is, however, one feature in which the machines differ, and which is unquestionably responsible for much of the difference in weight. The Voisin machine is fitted with a "chassis" with four wheels mounted to swivel freely, this being an essential feature of a well designed alighting mechanism; the front wheels are provided with a spring "suspension" to diminish the shock of landing or consequent on starting or alighting on rough ground. The Wright machine has no such provision, but possesses instead a pair of wooden runners of comparatively little weight.

The total weight of this "chassis" of the Voisin machine is said to exceed one hundredweight (50 kilogs.), and even if this is an exaggeration it certainly cannot be far short of that amount, and

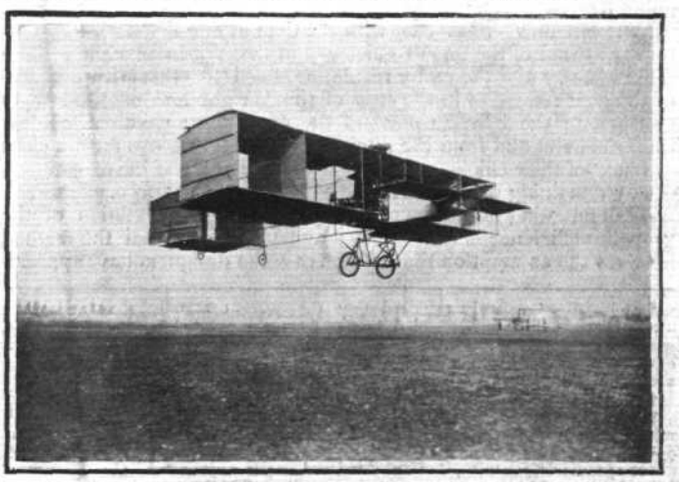


Photo by J. Theodoresco, Paris.

The Voisin-Delagrange biplane in full flight.

probably exceeds the corresponding weight carried by the Wright machine by at least 60 or 70 lbs. Now the total inert load carried by the two machines is otherwise about the same, and may be taken as about 200 lbs., representing the aeronaut and sundries, and it is evident that, other things being equal, the total weight of the machine should be proportional to the inert weight it has to raise, that is, in the ratio of 200 lbs. to 270 lbs. or thereabouts, and thus the greater weight of the Voisin machine is in most part explained.

If the runners of the Wright machine would do all that can be done by the Voisin mounting, then this additional weight would not be justified, but they will not do so; the Voisin machine can rise by itself from any reasonably smooth surface; the Wright is unable to

take flight without its launching gear, hence it is not legitimate to attribute its relative lightness to the superiority of its design.*

Horse-power.—The next point of comparison is that of the horse-power employed as related to the weight and velocity, thus touching on the question of the relative efficiency of the two machines.

The author has shown† that for equal perfection of design the resistance to flight of two machines of equal weight is approximately independent of the velocity of flight, consequently the horse-power will vary directly as the velocity of flight, and the Voisin machine is entitled to more power both on account of its greater weight and on account of its greater velocity; in the absence of more exact information we may take the velocity of the Voisin machine as being 10 per cent. greater than that of the Wright, this is roughly in accordance with the figures already given.

The declared b.h.p. of the motors is sometimes not very reliable; it is customary to use the expression in a rather elastic manner. Let us make an estimate based on the cylinder dimensions and revolution speed of the two engines, assuming the same mean pressure for both. Employing the figures already given, and for the purpose of comparison assuming a mean pressure = 72 lbs. per sq. in., *as appearing at the brake*, we have, at the speeds corresponding to the declared b.h.p.:—

	bore.	stroke.	revs.	b.h.p.
Wright	4·25 ins.	× 4 ins. at	1200 ...	24·7
Voisin (Antoinette) ...	4·35 ins.	× 4·15 ins. at	1100 ...	49·2

which agree remarkably well with the declared h.p. in both cases.

It is still questionable whether the declared speeds of revolution are those actually employed in flight. The author believes that in both cases the speeds are, if anything, under stated, at least for the ordinary conditions of flight; they may, however, be taken in good faith, and we accept as a fact that the b.h.p. supplied to the Voisin machine is almost exactly double that fitted to the Wright.

On the above basis the Wright machine is fitted with 1 b.h.p. for every 45 lbs. sustained, which rate would give the Voisin machine 34 b.h.p., or, allowing for the difference in the speed of flight, 38·5 b.h.p. should be sufficient to place the machines on an equal footing. But the actual b.h.p. of the Voisin is 49·2, or an excess of about 28 per cent., and this excess must either be accounted for as a *surplus of power*, the measure of which is the rate that the machine can increase its altitude, or it represents a loss of efficiency in the propulsion or sustentation.

Now there does not seem to be any substantial difference between the reserve lifting power of the two machines; they both appear to have about 10 or at most 20 per cent. surplus power. Mr. Wright claims more, but the performance of his machine does not seem to bear out his claim.‡ We may consequently infer that the loss of power in the Voisin machine is correctly represented by the foregoing figures.

We will now endeavour, with the data at our disposal, to ascertain the cause of the loss of efficiency in the Voisin machine. The flight velocity and the motor revolution speed (together with the ratio of the gear reduction in the case of the Wright machine), allow us to calculate the *effective pitch* of the propellers; we already know their diameter and from the pitch diameter ratio we can form a close estimate of their efficiency, we shall then be able to form an estimate of any remaining difference in the efficiency of the two machines.

Without going into the method by which the computation of the propeller efficiency is effected, it may be remarked that the method involves the assumption that in each case the designers have approximately determined the form of best efficiency under the restricted conditions of the pitch-diameter ratio adopted. That this assumption may not always be correct is obvious, but that it is somewhere near the truth in the two cases under discussion the author has been able to satisfy himself.

The method beyond this consists of a simple and elementary application of the principles laid down in the author's "Aerodynamics," chap. IX.

Firstly, to determine the effective pitch. This in the case of the Voisin machine is given by the distance travelled, divided by the number of revolutions in the same time. In the Wright machine the result has to be multiplied by the gear-ratio. In the case of the Voisin machine, we have 66–18·3 = 3·6 ft. as the effective propeller pitch; in the Wright machine we have $\frac{58 \times 33}{20 \times 10} = 9{\cdot}6$ ft. Or the diameter in terms of effective pitch in the two cases is, Voisin 2·1; and Wright ·88.

The efficiencies found by the author as appropriate to these pitch-ratios are respectively: Voisin, ·54; Wright, ·68, or deducting in the latter case 5 per cent. on account of the chain drive (certainly not a too great allowance for the power consumed by a chain running at about 16 ft. per sec.), we have the efficiency of propulsion: Voisin, ·54; Wright, ·63.

In the table that follows, col. 1 gives the foot-lbs. given out by the respective motors per revolution on the basis already employed,

	1 Ft.-lbs. per revolution.	2 Ft. per revolution.	3 Efficiency.	4 Lbs. thrust.	5 Weight.	6 Tan.	7
					lbs.		
Wright ...	705	2·9	·63	155	1,300	·12	7°
Voisin ...	1,550	3·6	·54	230	1,720	·135	7° 40′

i.e., 72 lbs. per sq. in. mean pressure. Col. 2 gives the feet traversed by the machine per motor revolution. Col. 3 gives the efficiency of propulsion as above. Col. 4 gives the thrust in lbs. calculated from the three preceding columns. Col. 5 gives the weights of the machines augmented by an amount that would absorb the whole thrust in horizontal flight, that is the maximum weight that can be sustained in flight. Col. 6 gives the resulting value of tan γ; and col. 7 gives the equivalent in degrees.

(To be concluded.)

Aeronautical Patents.

Applied for in 1907.

Published December 31st, 1908.

26,884. M. S. BJELOVUČIĆ. Propellers.

Applied for in 1908.

Published December 31st, 1908.

9,069. L. BLERIOT. Balancing and steering apparatus.

21,363. MOTORLUFTSCHIFF-STUDIENGES. Rudders for airships.

FLIGHT.

Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT *will be forwarded, post free, to any part of the world at the following rates:—*

UNITED KINGDOM.	s.	d.	ABROAD.	s.	d.
3 Months, Post Free ...	1	8	3 Months, Post Free ...	2	6
6 ,, ,, ...	3	3	6 ,, ,, ...	5	0
12 ,, ,, ...	6	6	12 ,, ,, ...	10	0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., *and crossed London and County Bank; otherwise no responsibility will be accepted.*

Should any difficulty be experienced in procuring FLIGHT *from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.*

NOTICE.—Advertisement instructions should reach the office, 44, St. Martin's Lane, W.C., by first post, Thursday. The latest time for receiving small alterations for Advertisements is 12 noon, Thursday. No alterations can be made after that hour.

* It has been recently reported that the Wright machine has undergone alterations by which it is enabled to rise from the ground by its own power, whether the machine has been fitted with permanent wheels, or whether it is mounted temporarily on a trolley which it leaves behind when it rises, the account does not say; probably it is the latter.

† "Aerial Flight"; Vol. II., "Aerodynamics," Chap. VII.

‡ The rate of increase of altitude of a machine having a reserve of 40 per cent. would be quite sensational. Thus at 1,000 metres per minute velocity, the power required for horizontal flight may be represented by a loss of altitude of about 130 metres per min., and an additional 40 per cent. would give an actual rate of ascent of over 50 metres per minute. The Wright machine does not, in the author's opinion, show so great a capacity of ascent. At the time of the author's visit a passenger of about 60 kilogs. weight was being carried; the machine should still have been able to rise at a rate of over 1 metre in two seconds. It is on record that on one occasion Mr. Wright took up with him a passenger weighing 100 kilogs.; but on the other hand, on another occasion, he failed, after repeated attempts, to raise another passenger of approximately this weight. It may consequently be inferred that an addition of 100 kilogs. to the 500 kilogs. normally carried—that is, an addition of about 20 per cent.—represents approximately the limit of the capacity of the machine.

Beyond this Mr. Wright has admitted (at least to the author) that his gliding angle is about 7 degs.; this at a gross weight of 1,100 lbs. gives 140 lbs. thrust required, and at 58 ft. per sec. the thrust h.p. becomes 14·5. Now Mr. Wright also agrees 24 b.h.p. as the power of his motor, which if 40 per cent in excess of his requirements gives 17·1 b.h.p. as ordinarily utilised, or the total efficiency of gear and screw-propeller would be 85 per cent.—a manifest absurdity.

If Mr. Wright's statement may be taken to mean that the *thrust* h.p. required is about 15 to 16 h.p., and that his reserve of power is 40 per cent. to include that lost in propulsion, then the whole matter is clear. It is possible that the author misunderstood Mr. Wright's meaning.